Serial No. 09/765,857

In the specification:

On page 6, amend the paragraph beginning at line 14 as follows:

First consider the soft-decision metric for the first bit (bit 0) of a 16-QAM symbol as shown in FIG. 3, assuming that $z = x + jy$ was the received symbol. There are three cases to consider: $y > 2a$, $-2a < y < 2a$, and $y < -2a$. For example, if z has an imaginary value, y, that is greater than $2a$ than the closest constellation point having a first bit of 0 will be the 0001 point. If z had been slightly less than $2a$ then the ~~closet~~ closest constellation point having a first bit of 0 would have been different, i.e. the 0101 point. Therefore, the line y=$2a$ (and correspondingly y=$-2a$) form a decision boundary. When $y > 2a$ as shown, $c_{0,0} = x_0 + j3a$, while $c_{0,1} = x_0 - ja$. Note that the real part of $c_{0,0}$ and $c_{0,1}$ is the same, denoted by x_0. In other words, all the constellation points across each row in the constellation have the same first bit, so it is not important to determine the x location of z. As a result, the soft-decision metric for bit 0 will only be a function of y. This is due to the square constellation and the properties of the Gray coding. In fact, all of the soft-decision symbols for both 16-QAM and 64-QAM will exhibit this behavior; they will either be a function of x or y, but not both.

On page 11, amend the paragraph beginning at line 2 as follows:

The equations given in the previous sections demonstrate that soft-decision metrics can be generated without calculating and searching through the squared distances between z and M constellation points. Ideally, however, the soft-decision metrics would be generated by a single function for all values of z, rather that a piecewise continuous function. This can be accomplished by restricting the set of constellation points in Eq. 2 to those which are closest to the boundary between a bit value of 0 and 1 (0/1 boundary) in the x-y plane. S_i then becomes the set of constellation points closest to the 0/1 boundary where bit i equals 1, while $\overline{S_i}$ is the set of constellation points closest to the 0/1 boundary where bit i equals 0. This is equivalent to taking the equations derived in the previous sections and only using the cases which contain the 0/1 boundaries in the x-y plane. In other words, the soft-decision metric generated for any symbol is defined by the difference between the squares of the distances between the restricted constellation points having 0 and 1 bit values ~~closet~~ closest to the 0/1 boundary and a hypothetical symbol falling within that range of restricted constellation points. In particular, the soft metric determined for a hypothetical symbol falling within the restricted range is attributed to any possible symbol value in the constellation.

On page 13, amend the paragraph beginning at line 2 as follows:

FIGs. 5 and 6 ~~shows~~show simulation results using simplified decoding in accordance with the present invention. The performance results were verified through numerical simulations. Simulation was done to compare the performance of the soft-decision metrics generated by the dual ~~mimima~~ minima method in Eq. 3 to those generated according to the simplified equations in accordance with the present invention. Bit error rate was simulated for an AWGN channel and for single-path Rayleigh fading at 100 km/h. In each case, R = ½ Turbo coding was used and the block sizes were as follows in Table 1.